

Name: _____

Date: _____

Evaluating Limits as $x \rightarrow \pm\infty$

Find the numerical value of each limit, or state that the limit does not exist, or is best described as being ∞ or $-\infty$.

1. $\lim_{x \rightarrow \infty} x$

13. $\lim_{x \rightarrow \infty} \frac{-x^4 + 2x + 1}{x + 10}$

2. $\lim_{x \rightarrow -\infty} 2x$

14. $\lim_{u \rightarrow \infty} \frac{u^3 + 3u^2 - 2}{4u^3 - 5u + 3}$

3. $\lim_{x \rightarrow -\infty} x^2$

15. $\lim_{x \rightarrow \infty} \sqrt{\frac{3x+5}{6x-8}}$

4. $\lim_{x \rightarrow \infty} (3x^2 - x - 2)$

16. $\lim_{x \rightarrow \infty} \frac{x^2 - 16}{x^2 - 5x + 4}$

5. $\lim_{x \rightarrow \infty} \frac{1}{x}$

17. $\lim_{x \rightarrow \infty} \frac{x^3}{x-5}$

6. $\lim_{x \rightarrow \infty} \frac{x+3}{2x-2}$

18. $\lim_{x \rightarrow -\infty} \frac{1}{x^2}$

7. $\lim_{x \rightarrow -\infty} \frac{5-x}{x^3+1}$

19. $\lim_{x \rightarrow \infty} \frac{4x}{2x+3}$

8. $\lim_{x \rightarrow \infty} \frac{x^2 + 2x - 5}{x+1}$

20. $\lim_{x \rightarrow \infty} \frac{x^2}{5-x+3x^2}$

9. $\lim_{x \rightarrow -\infty} \frac{x^3}{x^2+1}$

21. $\lim_{x \rightarrow \infty} (x-2)^{-3}$

10. $\lim_{x \rightarrow \infty} \frac{3x-2}{9x+7}$

22. $\lim_{x \rightarrow \infty} \frac{7}{x^2} - 4$

11. $\lim_{x \rightarrow \infty} \frac{6x^2 + 2x - 4}{6x^2 - 3x + 4}$

23. $\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2+2}}{3x-6}$

12. $\lim_{x \rightarrow \infty} \frac{x^2 + x - 2}{4x^3 - 1}$

24. $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2+2}}{3x-6}$

Practice

Find the numerical value of each limit, or state that the limit does not exist, or is best described as being ∞ or $-\infty$.

$$1. \lim_{x \rightarrow \infty} \frac{3-x^2}{x}$$

$$2. \lim_{x \rightarrow -\infty} -3x$$

$$3. \lim_{x \rightarrow -\infty} -x^2$$

$$4. \lim_{x \rightarrow \infty} (7x+3)$$

$$5. \lim_{x \rightarrow \infty} \frac{1}{(x-2)^2}$$

$$6. \lim_{x \rightarrow \infty} \frac{6x^2+3x-8}{2-4x+7x^2}$$

$$7. \lim_{x \rightarrow -\infty} \frac{x^4}{x^3+7x^2}$$

$$8. \lim_{x \rightarrow \infty} \frac{3x^2+9x-6}{x^3-9x^2-8}$$

$$9. \lim_{x \rightarrow -\infty} x^3-5$$

$$10. \lim_{x \rightarrow \infty} \frac{2x^3+3}{x^2+5}$$

$$11. \lim_{x \rightarrow \infty} \frac{x^2-x-6}{x^2+x-12}$$

$$12. \lim_{x \rightarrow \infty} \frac{6-x^3}{x}$$

$$13. \lim_{x \rightarrow \infty} \frac{x^2-1}{x^2+1}$$

$$14. \lim_{u \rightarrow \infty} \frac{3u^2-u-2}{5u^2+4u+1}$$

$$15. \lim_{x \rightarrow \infty} \sqrt{\frac{4x+5}{8x-7}}$$

$$16. \lim_{x \rightarrow \infty} \frac{8x^3+x}{(2x-1)(2x^2+1)}$$

$$17. \lim_{x \rightarrow \infty} \frac{4x^3-x^2}{(x+1)^3}$$

$$18. \lim_{x \rightarrow \infty} \left(\frac{1}{x} - \frac{2x}{x-1} \right)$$

$$19. \lim_{x \rightarrow -\infty} \left(\frac{x-1}{x+1} + 6 \right)$$

$$20. \lim_{x \rightarrow -\infty} \frac{4x^2+1}{2+3x^2}$$

$$21. \lim_{x \rightarrow -\infty} (x-1)^{-3}$$

$$22. \lim_{x \rightarrow \infty} \left(4 - \frac{7}{x^3} \right)$$

$$23. \lim_{x \rightarrow -\infty} \frac{\sqrt{x^2+2}}{5x-6}$$

$$24. \lim_{x \rightarrow \infty} \frac{\sqrt{x^2+2}}{5x-6}$$